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THIS FINAL REPORT IDENTIFIES POSSIBLE INTERIM RESPONSE ACTIONS (IRA'S) THAT MAY REDUCE THE FUTURE RELEASE OF CONTAMINATED WATER FROM SUMP 1727 IN THE NORTH PLANTS AREA. THESE INCLUDE:
1. TREATMENT WITH EXISTING AA/GAC TREATMENT SYSTEM
2. EVAPORATION POND
3. ELIMINATION OF KNOWN SOURCES AND TREATMENT WITH EXISTING AA/GAC TREATMENT SYSTEM
4. DECOMMISSION SUMP AND ASSOCIATED LINES
5. CONSTRUCTION OF NEW SUMP AND TREATMENT WITH AA/GAC
6. RETROFIT EXISTING SUMP
7. DIRECT DISCHARGE TO SURFACE WATERWAYS (NO ACTION).

EACH IRA IS EVALUATED FOR:
1. EFFECTIVENESS IN REDUCING THE MOBILITY, TOXICITY, AND VOLUME OF CONTAMINATED WATER
2. COSTS
3. IMPLEMENTABILITY.

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U.S. ARMY
MATERIEL COMMAND

— COMMITTED TO PROTECTION OF THE ENVIRONMENT —

Task 30
Sump 1727
Interim Response Action
Alternatives Assessment
Final Report
Version 3.2

July 1988
Contract Number DAAK11-84-D-0016

Environmental Science And Engineering, Inc.

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LITIGATION TECHNICAL SUPPORT AND SERVICES

Rocky Mountain Arsenal

Task 30
Sump 1727
Interim Response Action
Alternatives Assessment
Final Report
Version 3.2

July 1988
Contract Number DAAK11-84-D-0016

PREPARED BY

ENVIRONMENTAL SCIENCE AND ENGINEERING, INC.

PREPARED FOR

U.S. ARMY PROGRAM MANAGER'S OFFICE FOR ROCKY MOUNTAIN ARSENAL

TABLE OF CONTENTS
(Page 1 of 2)

TABLE OF CONTENTS
(Page 2 of 2)

LIST OF FIGURES

LIST OF TABLES

1.0 INTRODUCTION

The Rocky Mountain Arsenal (RMA) consists of approximately 17,000 acres and is situated in Adams County, Colorado, about 9 miles northeast of downtown Denver as shown in Figure 1.0-1. Industrial complexes were established on RMA for the manufacture of chemical and incendiary munitions. Figure 1.0-2 illustrates their locations. Sump 1727 is part of the North Plants industrial complex as shown in Figure 1.0-3.

1.1 BACKGROUND OF SUMP 1727

Construction of the North Plant facilities for the production of GB (Sarin) nerve agent was begun in 1950 and was completed in 1953. Manufacture of GB was performed from 1953 until 1957, and GB munitions filling operations continued until late 1969.

From 1952 to 1973, all liquid waste generated in the North Plants area was pumped to Sump 1727, neutralized with caustic solution and water, and then discharged to Basin A or Basin F (Barbieri, 1987). During demilitarization operations from 1973 to 1976, sump wastes were tested to certify that they were not contaminated by nerve agents before they were pumped to Basin F. Contaminated wastes were pumped to Building 1703 to be spray dried (Watson, 1974; Mack, 1985). After 1976, all wastes collected in the sump were disposed in the spray drying facility (Mack 1985). In 1982, the discharge pipeline to Basin F was capped, although flow to Basin F from Sump 1727 had ceased in 1976. In 1985 spray drying was discontinued due to the condition of the facility (Barbieri, 1988).

Sump 1727 was designed to handle the liquid waste generated within the North Plants facility. The sump was built to hold approximately 80,000 gallons (gal) (dimensions 20 ft x 30 ft x 18 ft). The main sources of wastewater collecting in the sump were floor washdowns, spill neutralizations/flushings, and stormwater runoff from diked storage areas. For the past 3 years, water has collected in Sump 1727 from leakage of water lines, possible ground water infiltration, and inflow of stormwater runoff in the North Plants area.

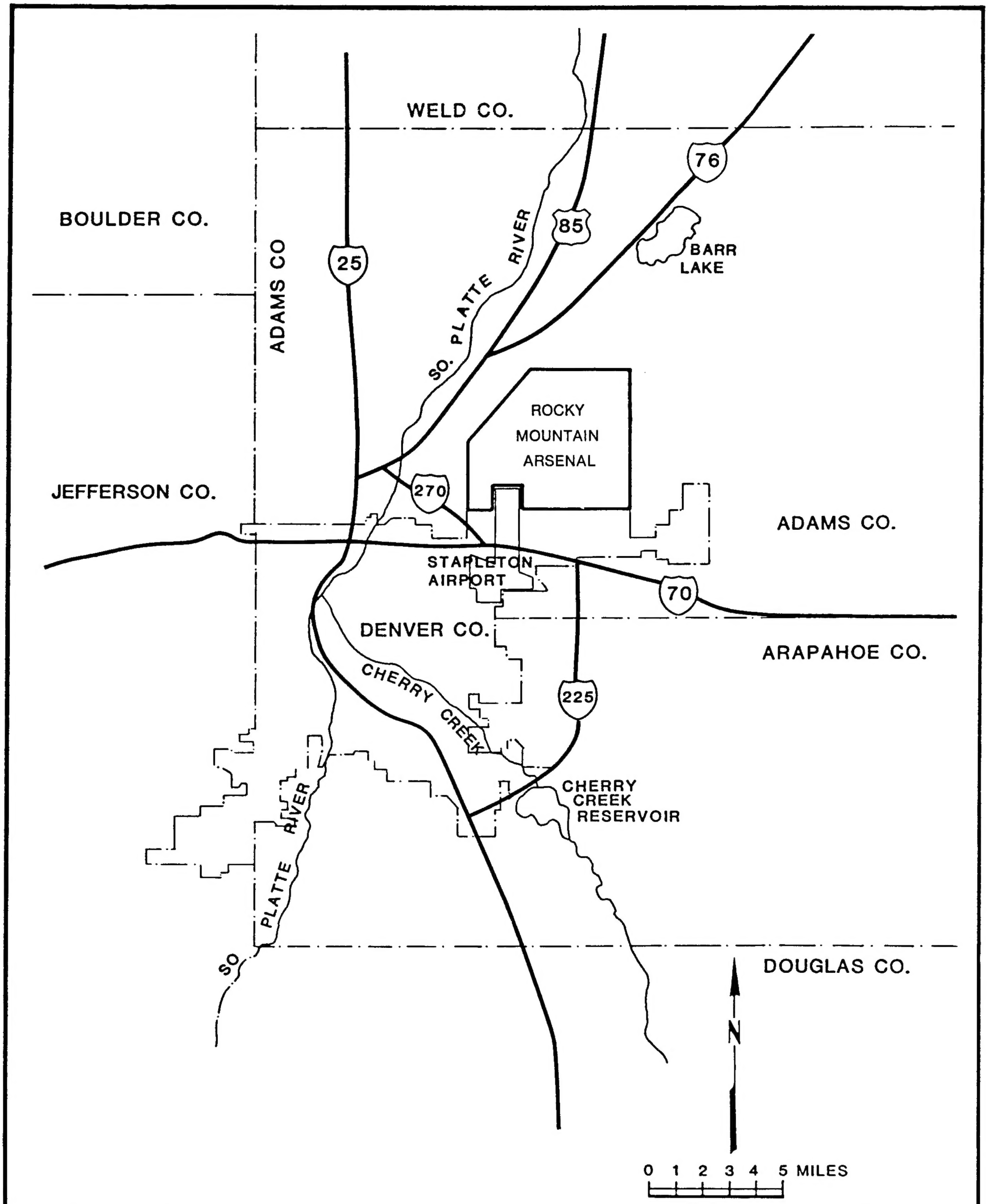

Figure 1.0-1
ROCKY MOUNTAIN ARSENAL LOCATION

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For Rocky Mountain Arsenal
Aberdeen Proving Ground, Maryland

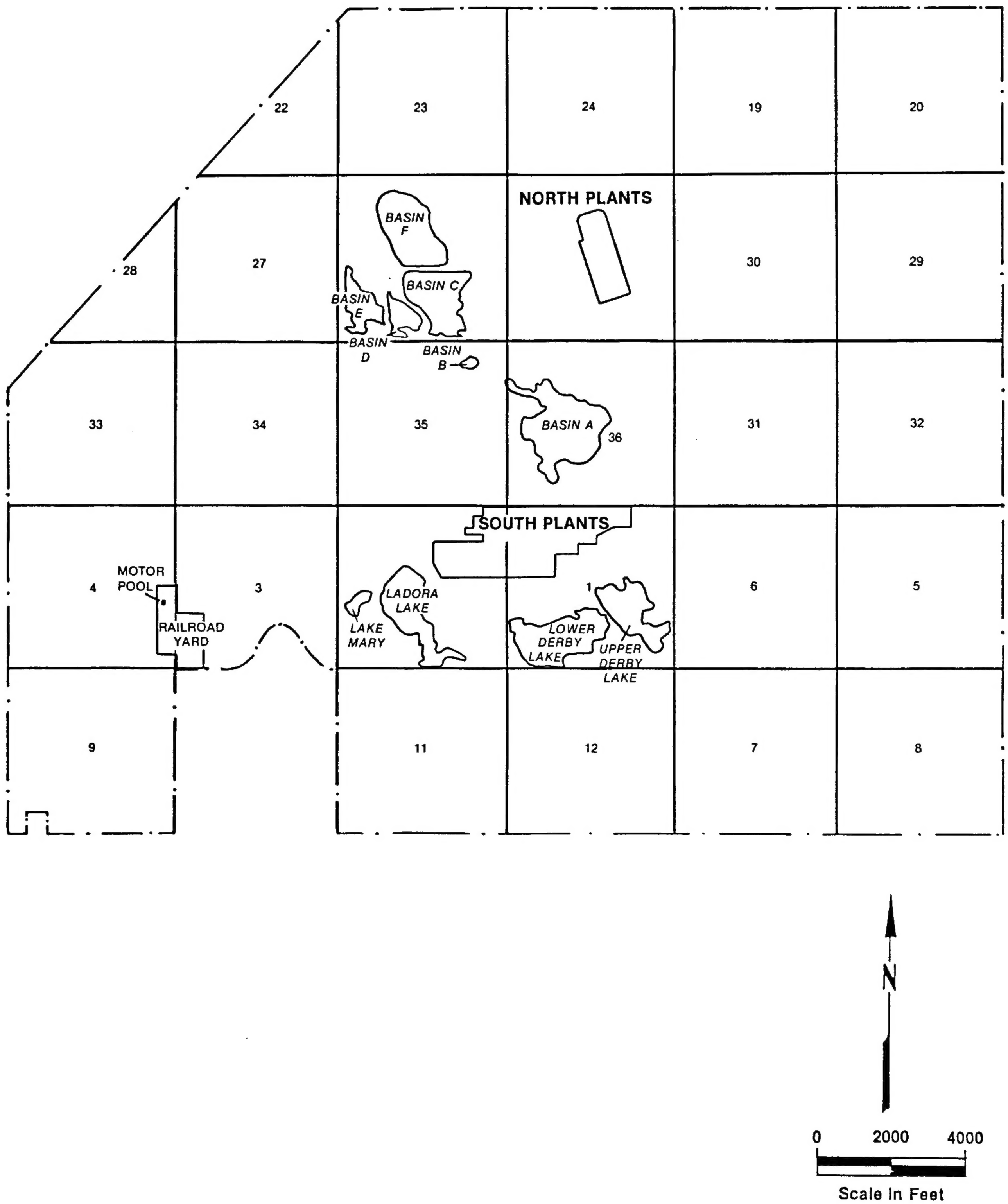

Figure 1.0-2
ROCKY MOUNTAIN ARSENAL SITE

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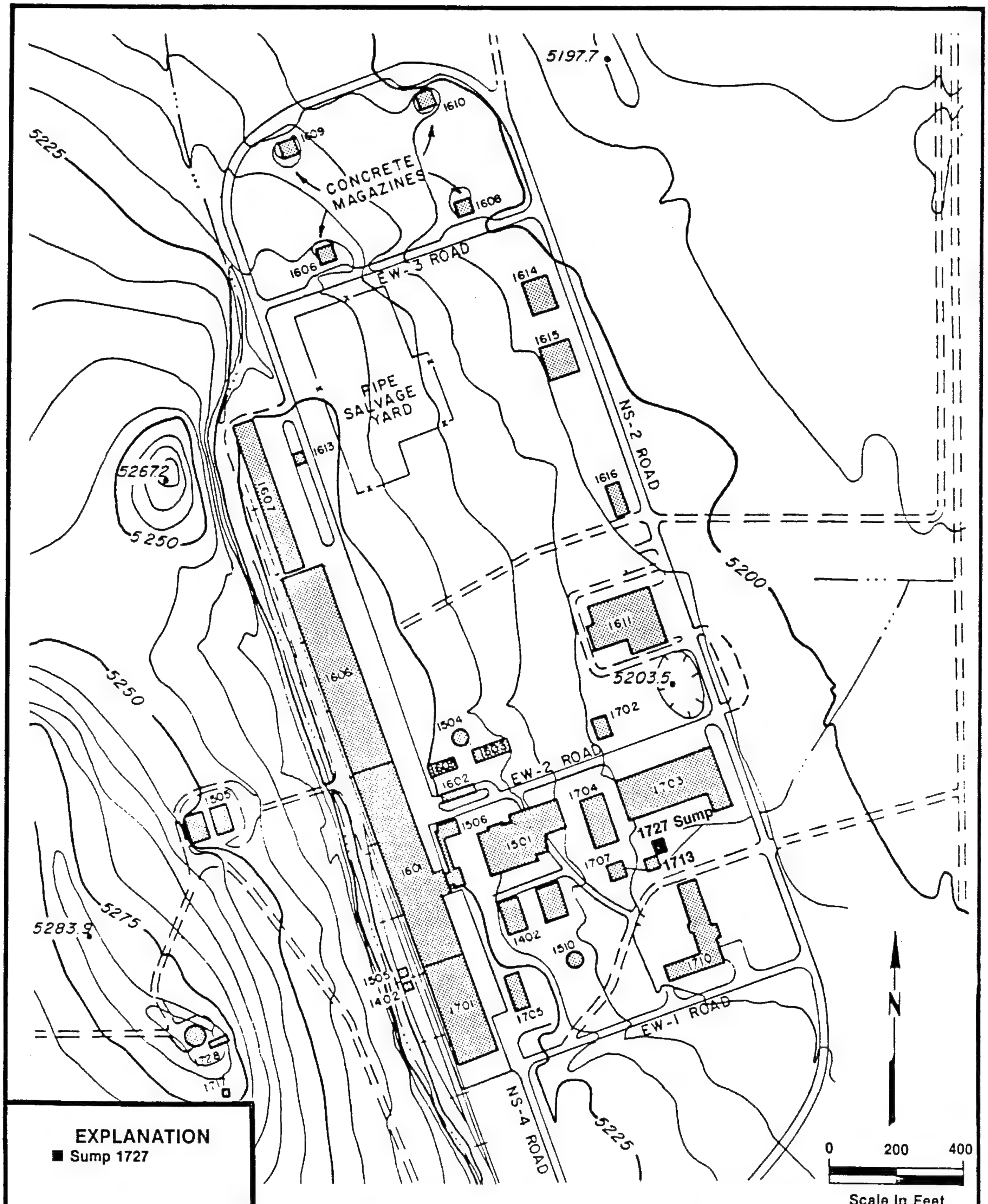

Figure 1.0-3
LOCATION OF SUMP 1727

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Ground water may be entering basements of North Plant buildings that drain to Sump 1727 or may be entering underground broken pipelines which lead to Sump 1727. Preliminary water levels taken around the sump indicate that it is highly unlikely that the sump is in direct contact with ground water. The water table elevation in the sump area is approximately 5,182 ft (Ebasco, 1988) while the bottom of the sump is at an elevation of 5189 ft (Kellex, 1951). If these elevations are correct, even seasonal variations in the water level would not put the sump in contact with ground water.

Stormwater runoff may be entering the sump from diked storage areas in the vicinity of North Plants or may be leaking into building basements that are connected to the sump. Stormwater could also accumulate at sections of broken underground pipelines that lead to the sump. This would account for the small delay of approximately 12 hours observed after a storm for the sump water level to rise.

The latest field inspection indicated that the diked storage areas, 1402, 1403-1405, 1502, 1507, and 1508 have little water in them. Most of the water in the diked areas is located in pump/drain depressions. The water level in 1506 is approximately 4 inches. The level of Sump 1503 adjacent to Building 1501 has a water level of approximately 13 ft, and Building 1501 is dry. The vault of underground storage tanks adjacent to Building 1506 has an average water level of 8 ft (ESE, 1988).

The exposed portion of Sump 1727 is in poor condition. The exterior is badly spalling, and at some places, reinforcing bar (re-bar) is visible. The interior walls of the sump appear to be in fairly good condition, however, the lip of the sump has some cracks. The northeast top corner has a large crack where water has been observed to seep through the concrete. The water level has been kept well below this crack during the last year.

The water level was approximately 8 ft from the bottom when the sump was last inspected. The internal walls appeared to be in good condition, but were not entirely assessable. The lighting in the sump was poor and there was about 1/4 inch of residue on the walls. The bottom 8 ft of the sump was not visible due to the water level. Therefore, the integrity of the entire

sump was not determined. If the sump is cracked below ground level it is possible that water could be seeping through the concrete into the surrounding soil. Once the sump is emptied and cleaned out a field inspection would determine the integrity of the sump.

1.2 PREVIOUS ACTIONS

In January 1987, underground potable water lines outside of Building 1501 in the GB Plant broke as a result of freezing temperatures. The water that leaked into the basement was subsequently pumped into Sump 1727, nearly filling it. In an emergency response to the near overflow condition of the sump throughout the year, over 60,000 gal of water were pumped from the sump into tanks positioned nearby. A good portion of the 60,000 gal of water was probably from the water line break. As a result of the water line break, all process, potable, and fire protection water was shut off to the North Plants area to prevent water from leaking into Building 1501 and adjacent buildings. The broken water line has not been repaired and the water to the North Plants area has remained shut off.

In February 1987, samples of the sump water were collected for analysis, and the analytical results indicated that the water contained elevated levels of arsenic (As), cadmium (Cd), lead (Pb), fluoride (F), and Isopropylmethyl phosphonate (IMPA). The source of contamination may be from chemical sewer lines, sediments in building basements, or previous tank farm spills. Samples taken from the 1506 underground storage vaults, the 1503 sump adjacent to Building 1501 and the venturi scrubber sumps for buildings 1503 and 1603 contained low concentrations of As (Ave = 8.5 ug/l), F (Ave = 4 ug/l), and IMPA (Ave = 500 ug/l). Cd and Pb were not detected in any of these samples (ESE, 1988). These data tend to indicate that water in these buildings is not the primary source of contamination. Sediments and sludge in the sump appears to be the primary source of contamination. Relatively clean water may be accumulating in the sump, becoming contaminated by the sediments and sludge. Once the sediments and sludge have been removed and treated, contamination may no longer be a problem. The sump contains approximately 2 to 3 ft of sediment and sludge (ESE, 1988).

As an interim solution to the problem of water accumulation in Sump 1727, a treatability study (ESE, 1987) was performed to evaluate systems that would remove these contaminants from the sump water.

During the period between February and April of 1987, the chemistry of the water in Sump 1727 changed. The analytical monitoring, conducted as the treatability study progressed, confirmed that the water chemistry had gradually changed. The sump water still had elevated levels of As, F, and IMPA and a high pH (12-13), but Pb and Cd no longer appeared at elevated levels. A possible explanation of the Pb and Cd levels gradually decreasing, during the period between February and April, is that Pb and Cd were suspended solids in the sump water and settled to the bottom of the sump.

The system that was recommended and implemented to treat the accumulated water was activated alumina (AA). During October and November 1987, a small AA unit was installed in conjunction with a granulated activated carbon (GAC) unit. The AA unit adjusts the pH and removes As and F. The GAC unit was included to reduce trace organics including IMPA. The system also included 30 micron filters to remove suspended solids. This emergency response system has been operating and treating the water from the sump and the water that was pumped into storage tanks to prevent overflow. Recent analytical data, taken while the treatment system was processing water from further down in the sump closer to the sediment and sludge, indicate that Cd and Pb are tied up in suspended solids and are effectively being removed by the 30 micron filters (ESE, 1988).

Analytical data taken immediately prior to AA change-out indicate that the AA/GAC treatment system is still removing at least 99 percent of the As, at least 90 percent of the F and all of the Cd and Pb. IMPA does not appear to be effectively removed by the GAC (ESE, 1988). As a result of these data, the contact time with GAC has been doubled. If the increased contact time does not increase IMPA removal, and if IMPA levels persist after removal of the sump sediments, methods to address IMPA removal may need to be further investigated. Table 1.2-1 summaries these data.

1.3 PURPOSE OF INTERIM RESPONSE ACTION REPORT

This report will identify possible Interim Response Actions (IRA) that may reduce future release of contaminated water and the potential adverse affects associated with a release of contaminated water. This report will also evaluate the effectiveness of each IRA to reduce the mobility, toxicity or volume of contaminated water. Costs will be presented in this report so the IRAs can be evaluated on an order of magnitude cost basis. Finally, this report will evaluate the implementability of each action and summarize the findings. Implementability will include time estimates to complete the action.

2.0 INTERIM RESPONSE ACTION

2.1 JUSTIFICATION FOR AN INTERIM RESPONSE ACTION

An IRA is required to reduce the possibility of contaminated water in Building 1727 sump from migrating into the environment. Last year, over 60,000 gal of contaminated water was pumped into storage tanks in order to avoid over filling of the sump. The Record of Decision (ROD) for the final remedial action(s) will not be completed for at least 5 years. If water accumulates at the same rate as it did during 1987, this will translate into nearly 300,000 gal of water. An IRA will be necessary during this 5-year period to reduce the possible release of contaminated water and the risks associated with this water. Therefore, an IRA needs to be selected with the objective to mitigate any remaining threat of release of liquids from Sump 1727.

The time sequence between the IRA and the FS process will be important. If the IRA is identified, planned, and executed, the FS alternatives analysis will take into account the IRA. If, however, the IRA is not executed by the time the FS is considering a final response action, the final response action will consider the IRA but will not be driven by the proposed IRA. In either case, the IRA will be consistent with the proposed final response action.

2.2 SUMMARY OF POSSIBLE INTERIM RESPONSE ACTIONS ALTERNATIVES

The IRAs discussed and evaluated in this report include:

- Pump and Treat With Existing AA/GAC Treatment System - Water accumulating in Sump 1727 would be pumped to the existing AA/GAC treatment system. This treatment system would continue to operate, and the treated water would be discharged. Three scenarios for discharge would be discussed including discharge to surface waterways, discharge to the sewage treatment system and discharge to the South Plants Treatment System. The effectiveness of the treatment system may be impacted by changing influent water chemistry;
- Evaporation Pond - An evaporation pond would be constructed adjacent to Sump 1727 to naturally enhance volume reduction of

liquids by evaporation. Water accumulating in Sump 1727 would be pumped to the evaporation pond;

- Identify and Eliminate Known Sources and Pump and Treat with Existing AA/GAC Treatment System - Sources of water to the sump that can be easily identified would be located and removed. These sources may include floor drains in basements, and stormwater runoff from diked areas. Reducing the sources that flow into Sump 1727 may help to identify the remaining sources and reduce water accumulating in the sump. Water accumulating in basements and diked areas, along with the water still accumulating in Sump 1727 would be pumped to the existing AA/GAC system for treatment;
- Decommission Sump and Associated Lines and Pump and Treat with Existing AA/GAC Treatment System - A field investigation would be performed to evaluate the impact of decommissioning the sump and associated lines. This would include removal of the sump and capping and removal of the associated lines. Decommissioning the sump would also including pumping and treating the water in the sump, pipelines and potential sources. Decommissioning the sump and associated lines may become the final action;
- Construct New Sump and Pump and Treat with Existing GA/GAC Treatment System - A new sump would be constructed to replace the existing sump at the same location. During the construction of a new sump, water would be pumped from Sump 1727, pipelines, and potential sources to the existing AA/GAC system. Once the new sump is completed the water within the sump would be pumped and treated to prevent over filling. Construction of a new sump and replacement of existing pipelines may allow long-term use. This option would also address broken lines and may assist in identifying the sources of inflow;
- Retrofit Existing Sump and Pump and Treat with Existing AA/GAC Treatment System - Repairing, lining and installing reinforcement supports in the existing sump may prolong the useful life of the sump. The water in the sump and at the potential sources would be removed and treated in the existing AA/GAC treatment system. Once the sump is retrofitted, the accumulating water would be pumped

and treated to prevent over filling. Retrofitting the existing sump may not ensure long-term integrity; and

- Direct Discharge to Surface Waterways (No-Action) - Water accumulating and eventually overflowing from the sump would not be treated or stored. The water would spill into the adjacent ditch. This interim action is the no-action scenario.

Each of these IRAs will be described and evaluated in Section 3.0 of this report.

2.3 EVALUATION CRITERIA

Each IRA alternative will be evaluated by effectiveness, cost and implementation. These criteria will be further broken into more specific criteria, and discussed in the following sections.

2.3.1 EFFECTIVENESS

Effectiveness will evaluate how well an interim response action will reduce mobility, toxicity or volume. The reduction of mobility will decrease the possibility of contaminated water being released to the environment. Mobility may be reduced by seepage controls, secondary containment or overflow protection. Toxicity will reduce the amount of contamination in the water. For example, a reduction of toxicity may involve removal of contaminants from water by adsorption. Finally, the criteria volume reduction, will evaluate how well an IRA reduces the volume of contaminated material. Volume reduction of contaminated water may be achieved by evaporation or other means of minimizing the volume of contaminated water.

2.3.2 COST

Order of magnitude costs will be developed for each alternative. Capital costs will contain one-time costs required to implement the action. These costs will include:

- Management;
- Planning;
- Design;
- Field Surveys;
- Safety;

- Sampling;
- Analytical Costs;
- Chemicals;
- Supplies;
- System Operation;
- Power Costs;
- Storage;
- Miscellaneous Equipment;
- Excavation;
- Demolition;
- Construction; and
- Materials.

Annual costs will include operation and maintenance costs such as:

- Management;
- Chemicals;
- Supplies;
- Shipping Charges;
- Power Costs;
- Storage;
- System Operation;
- Sampling and Analytical Costs; and
- Miscellaneous Equipment.

All costs developed in this report will include a 20 percent contingency to cover intangible costs and unplanned expenses.

The present worth of each IRA alternative will be calculated based on 5 years and a 10 percent interest rate. Present worth will allow actions with only annual costs to be compared with actions with capital and/or annual costs.

2.3.3 IMPLEMENTATION

The implementation criteria will be used to evaluate how easily a IRA alternative may be carried out. The time to complete an action will be estimated, and tasks required to implement the alternative, such as water removal, will be identified.

3.0 INTERIM RESPONSE ACTION ALTERNATIVES

The following sections describe each of the IRAs and evaluate effectiveness of reducing mobility, toxicity, or volume. An order of magnitude cost is presented for each action. Costs include labor, materials, and overhead costs, but do not include profit. Costs are taken from average actual contractor labor and service rates, vendor quotes, the Means Site Work Cost Data (Means, 1987), and the Dodge Cost Data (Dodge, 1987). Finally, an assessment of the implementation of each IRA is discussed. Tasks required for implementation and time are considered in the discussion.

3.1 ALTERNATIVE 1 - PUMP AND TREAT WITH EXISTING AA/GAC TREATMENT SYSTEM

3.1.1 DESCRIPTION

This IRA would utilize the existing AA/GAC treatment system located in Building 1713, directly west and adjacent to Sump 1727. The existing treatment system was installed during October and November of 1987 and operated in an experimental/debugging mode during January through April of 1988 to treat sump overflow water. The treatment system consists of a holding tank of untreated sump water, a pH adjustment system, and two treatment trains each consisting of a pump, 30 micron filters, two AA treatment units and a GAC unit. The treatment system has gone through a number of modifications to adapt to site conditions. Each treatment train treats 2 to 3 gal of water per minute.

The AA unit removes As and F, and the GAC carbon unit was installed to reduce IMPA and other trace organics. If the chemistry of the water changes, and Cd and Pb again appear at elevated levels and are not suspended solids, the system may need to be modified. Cd and Pb suspended solids have been effectively removed with the 30 micron filters (ESE, 1988).

Effluent from the emergency response operation of the treatment system has been discharged to holding tanks and the sewage treatment system. There are three possible discharge scenarios that would be considered for this IRA. They include the following:

- Discharge to surface waterways;
- Discharge to the sewage treatment system; and
- Discharge to the South Plants Treatment System.

Discharging to surface waterways would involve directing the effluent water to a nearby ditch east of the sump. The ditch eventually flows into First Creek, however, effluent discharged to the ditch would probably be absorbed into the soil or evaporate before it reaches First Creek.

Discharging to the sewage treatment system would remove particulates and treat the effluent water again for organics. The effluent from the AA/GAC treatment system would be discharged to the existing sewage system network. A manway east of the sump is the closest access to the sewer and would be accessed by discharge pipelines.

Discharging to the South Plants Treatment System would result in the retreatment of the effluent water with alumina and carbon before it is discharged to the sewage treatment system for additional treatment. This scenario retreats the effluent again from the AA/GAC system for As, F, and organics. This scenario would provide the most rigorous, if not excessive, treatment measures. However, this discharge option is likely to be unnecessary and would incur additional annual costs to transport the water to the South Plants Treatment System.

Chemical analyses would be required no matter which discharge option is used, and would determine how well the treatment system is performing and when the AA and GAC are exhausted. Operating the treatment system in a batch process would minimize the number of samples required to verify the water has been treated to an acceptable level for discharge. Assuming 60,000 gal of water will accumulate per year and one batch would treat 20,000 gal of water in little over 2 weeks, treatment would require three batches and approximately 3 months. Three composite samples per batch would include analysis for As, F, Cd, and Pb. Two composite samples per batch would include gas chromatography/mass spectrometry (GC/MS) scan for volatile and semi-volatile organics and ion chromatography for agent breakdown products. Field tests performed frequently, such as As detector strips and

F colorimeter tests would assist in determination of As and F breakthrough. The spent AA and GAC would be drummed and stored for final remediation.

3.1.2 EFFECTIVENESS

The existing AA/GAC treatment system would reduce the mobility of contamination by preventing the release of contaminated water. This IRA may not affect the possibility of contaminated water flowing from broken pipelines leading to the sump, or the possibility of contaminated water migrating from sources connected to the sump. Managing the sump water level may reduce the possibility of contaminated water seeping through the sump walls.

The toxicity of the sump water would be reduced by removing the As, F, and trace organics from the sump water. If IMPA levels persist after removal of the sump sediments and the increased GAC contact time, methods to address IMPA removal may need to be further investigated. Suspended solids containing Cd and Pb would be removed by the 30 micron filters. However, if Cd and Pb again appear and are not suspended solids, this treatment process would not reduce the toxicity of these compounds in the water, and additional corrective actions would be required.

The volume of contaminated media would be reduced as AA/GAC adsorb the contaminants from the water. This interim action would address the accumulating water problem at the sump. However, the disadvantages of this IRA are that it does not identify or eliminate the sources of water flowing into the sump or the possible migration of contamination occurring from breached lines.

3.1.3 COST

The costs developed for the existing AA/GC treatment system do not include capital costs, since the system is already paid for and installed. The annual cost of this IRA is estimated to be $52,000 and includes a 20 percent contingency. The annual costs have been listed in Table 3.1-1 and include chemicals, supplies, shipping charges, power costs, operation and management labor, analytical costs, AA and GAC storage, and miscellaneous equipment replacement. The numbers in Table 3.1-1 are based on 60,000 gallons per year. Major equipment failure costs are not included in the cost estimate.

TABLE 3.1-1 PUMP AND TREAT WITH EXISTING AA/GAC TREATMENT SYSTEM COST ESTIMATE

DESCRIPTION	QUANTITY	UNITS	UNIT COST ($)	TOTAL COST ($)
ANNUAL COSTS (1)				
** ADMINISTRATION **				
MANAGEMENT (LABOR)	100	HR	50	5,000
** ACTIVITIES **				
SYSTEM OPERATION (LABOR)	500	HR	30	15,000
ANALYTICAL				
F,As,Pb,Cd	9	SAMPLE	200	1,800
ALL COMPOUNDS (INFLUENT & EFFLUENT)	6	SAMPLE	1,500	9,000
DATA MANAGEMENT	20	HR	50	1,000
HAZARDOUS AA & GAC WASTE STORAGE				
DRUMS	15	EACH	30	450
POWER REQUIREMENTS	4	MONTH	100	400
TRANSPORTATION COSTS (2)	80	HR	100	(8,000)
** MATERIALS & IMPLEMENTATION **				
TANK RENTAL	120	DAY	20	2,400
ACTIVATED ALUMINA	3,000	LBS	0.60	1,800
ACTIVATED CARBON	850	LBS	1.40	1,192
SULFURIC ACID	35	GAL	16.75	586
FILTERS (100 PER BOX)	2	BOX	100	200
SHIPPING COSTS	--	--	--	1,500
MISC. PIPING/FITTINGS/VALVES	--	--	--	1,000
MISC. EQUIPMENT REPLACEMENT	--	--	--	1,500
		SUBTOTAL		$42,828
		20% CONTINGENCY		$8,566
		TOTAL ANNUAL COSTS		$51,394

PRESENT WORTH FOR 5 YEARS AND 10 PERCENT INTEREST:

PW = $194,823

(1) Based on 60,000 gallons per year.
(2) Not included in annual cost

SOURCE: ESE, 1988

This annual cost applies to direct discharge to surface waterways or the sewage treatment system.

Transportation costs to transport effluent water to South Plants are not included in the annual cost but would be approximately $8,000 per year. The present worth of this action is approximately $195,000 for a period of 5 years and assumes an interest rate of 10 percent.

3.1.4 IMPLEMENTATION

Pumping and treating with the existing AA/GAC system could be implemented very easily. Modifications to convert the system to a 20,000 gal batch process would be required. The discharge location would need to be selected and slight modifications to the effluent pipelines would need to be made. An electrical upgrade would be necessary for this IRA to operate over the 5-year period.

3.2 ALTERNATIVE 2 - EVAPORATION POND

3.2.1 DESCRIPTION

Alternative 2 would address water accumulating in Sump 1727 by pumping water from the sump to an evaporation pond. The evaporation pond would reduce the volume of water by natural evaporation.

The design of the evaporation pond would be based on 60,000 gal of water accumulating per year. A significant portion of water that accumulated over 1987 was probably from the water line break outside of Building 1501. This information and the fact that 1987 was a high precipitation year (20.03 inches) indicate that the design basis of 60,000 gal would be a conservative estimate. A larger evaporation pond may need to be designed if the major source of water that accumulated in 1987 was not from the water line break outside of Building 1501.

The evaporation pond would hold a maximum volume of 112,000 gal and have the approximate dimensions of 4 ft x 70 ft x 70 ft. The pond would ideally be filled to a 3-ft depth holding 83,000 gal. A 1-ft free-board would minimize the chance of overtopping due to wind and wave action, over filling, precipitation or a combination of these.

The pond would cover an area of approximately 5,200 square feet (ft^2) including the embankments. The surface area available to evaporate water would be approximately 3,600 ft^2. This area would evaporate 108,000 gal of water per year based upon a total annual evaporation of 48 inches per year (Linsley et al., 1975). Annual precipitation falling on the evaporation pond would total about 46,000 gal based on an average annual precipitation of 16 inches. The evaporation pond would be able to evaporate both the total amount of precipitation and the water that accumulates in Sump 1727. The total accumulation in the evaporation pond would be approximately 106,000 gal, which is less than the average 108,000 gal that would evaporate from the pond.

The general location of the evaporation pond would be approximately 200 ft southeast of Sump 1727 and east of Building 1710, as illustrated in Figure 3.2-1. Prior to implementing this IRA, a field survey and site reconnaissance would be performed to determine the best location.

The evaporation pond would be constructed according to Federal and State requirements for surface impoundments (40 CFR 267 Subparts A, B, D, & F and 40 CFR 264 Subpart K). Two high density polyethylene (HDPE) liners would be used in the construction of the evaporation pond. HDPE is inert to metals, most organics and extreme pHs, and would be ideal for this application since Sump 1727 water has a high pH and contains metals and possibly organics. The liners would be installed in the excavation with 1-ft layer of leachate collection material between the two liners. A network of perforated piping would collect leachate between the two liners. The piping would be graded so leachate flows to a small sump enabling detection of a leak. Monitoring wells would be installed according to 40 CFR 267 Subpart F. This IRA would also include monitoring and inspection programs.

3.2.2 EFFECTIVENESS

The evaporation pond would reduce the mobility of Sump 1727 water by providing secondary containment. Management of the sump water level would reduce the possibility of contaminated water seeping through the sump walls. Evaporation would not directly affect toxicity; however by evaporating

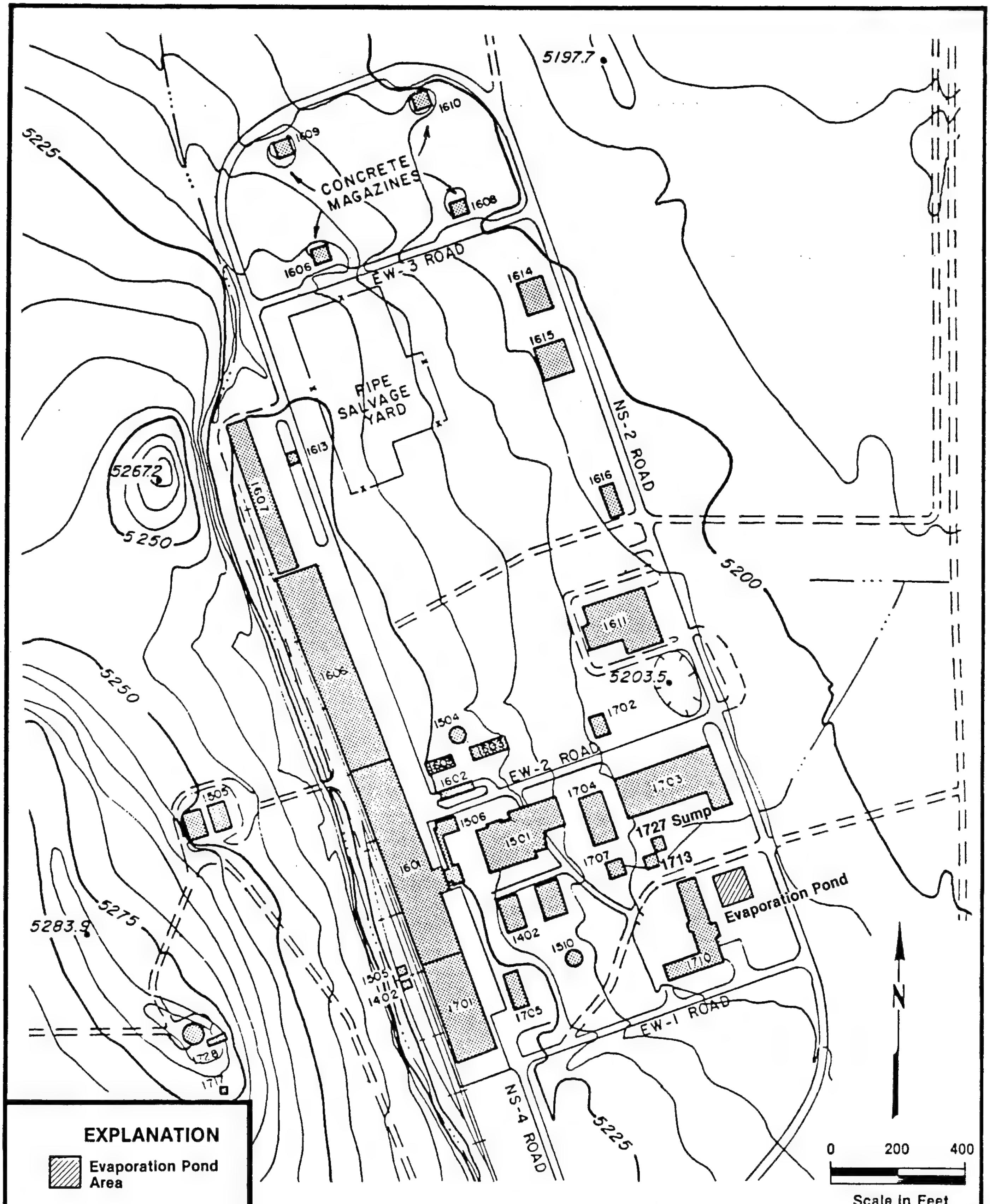

Figure 3.2-1
LOCATION OF EVAPORATION POND

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For Rocky Mountain Arsenal
Aberdeen Proving Ground, Maryland

water, the contaminants would be concentrated. Finally, natural evaporation would reduce the volume of water contained within the pond.

The water pumped from the sump and the annual precipitation would probably evaporate, leaving only residue. Organic contaminants may volatilize and dry residue may become airborne creating air emission concerns. For this IRA the residue would be kept slightly moist and would be cleaned out at least once a year to minimize air emissions. The residue would be drummed and stored for final remediation.

The major advantages of this IRA is that it would eliminate the water and it is not labor intensive. The evaporation pond would be effective in addressing the water accumulating in Sump 1727, but it would not solve the problem. The sources of water flowing into the sump would not be identified, reduced or removed.

3.2.3 COST

The capital costs developed for the evaporation pond included: excavation, construction of embankments, trenching, a small concrete sump, two HDPE liners, a leachate collection system, leachate collection material, piping and a transfer pump, drums for residue storage, and monitoring wells. These costs are broken down in Table 3.2-1. The total capital cost of this IRA is approximately $119,000 and includes a 20 percent contingency.

The annual cost for the evaporation pond is estimated to be $42,000 and includes a 20 percent contingency. The annual costs are listed in Table 3.2-1 and include management, ground water monitoring, weekly inspections, analytical costs, data management, power costs and residue removal costs. Costs incurred if the liner fails are not included in the cost estimate. Operation and maintenance costs are minimal for an evaporation pond, however, monitoring, inspection and analytical costs associated with monitoring are significant. The present worth of this action is approximately $275,000 for a period of 5 years and a 10 percent interest rate.

TABLE 3.2-1 EVAPORATION POND COST ESTIMATE

DESCRIPTION	QUANTITY	UNITS	UNIT COST ($)	TOTAL COST ($)
CAPITAL COSTS				
** ADMINISTRATION **				
PLANNING (LABOR)	80	HR	50	4,000
DESIGN (LABOR)	120	HR	50	6,000
MANAGEMENT (LABOR)	200	HR	50	10,000
** MATERIALS & IMPLEMENTATION **				
EVAPORATION POND				
EXCAVATION	514	CU YD	2.50	1,285
TRENCH TO SECURE LINERS	54	CU YD	1.66	90
EMBANKMENTS	53	CU YD	2.82	149
HDPE LINERS	15,500	SQ FT	3.00	46,500
TRENCHES FOR PIPING	111	CU YD	1.66	184
2" PVC PIPING	200	LN FT	10.02	2,004
TRANSFER PUMP	1	--	600	600
LEACHATE COLLECTION SYSTEM				
COLLECTION MATERIAL	177	CU YD	13.50	2,390
4" PVC PIPING (A PORTION PERFORATED)	50	LN FT	18.57	929
SMALL CONCRETE SUMP				
EXCAVATION	15	CU YD	2.50	38
BOTTOM SLAB	1.8	CU YD	319.37	575
WALLS	5.4	CU YD	359.71	1,942
TOP SLAB	1.8	CU YD	276.45	498
26" MANHOLE	1	--	379.60	380
WATER PROOFING	145	SQ FT	1.24	180
4" STD ALV MONITORING WELLS	3	EACH	7,000	21,000
		SUBTOTAL		$98,742
		20% CONTINGENCY		$19,748
		TOTAL CAPITAL COST		$118,491
ANNUAL COSTS				
** ADMINISTRATION **				
MANAGEMENT (LABOR)	100	HR	50	5,000
** ACTIVITIES **				
SYSTEM OPERATION				
QUARTERLY SAMPLING (LABOR)	100	HR	50	5,000
WEEKLY INSPECTIONS (LABOR)	52	HR	50	2,600
RESIDUE REMOVAL (ONSITE STORAGE)	40	HR	30	1,200
DRUMS	1	EACH	30	30
ANALYTICAL				
WATER	12	SAMPLE	1,500	18,000
DATA MANAGEMENT	12	HR	50	600
POWER REQUIREMENTS	12	MONTH	50	600
** MATERIALS & IMPLEMENTATION **				
MONITORING EQUIPMENT	12	SAMPLE	100	1,200
		SUBTOTAL		$34,230
		20% CONTINGENCY		$6,846
		TOTAL ANNUAL COST		$41,076

PRESENT WORTH FOR 5 YEARS AND 10 PERCENT INTEREST:

PW = $274,202

SOURCE: ESE, 1988

3.2.4 IMPLEMENTATION

The evaporation pond would take approximately 3 to 4 months to construct after contract award. This time does not include delays due to scheduling, weather or equipment failure. Because the liner becomes brittle when it is cold, the installation of the HDPE liners must be done during late spring, summer, or early fall.

New surface impoundments must have a ground water monitoring program (40 CFR 267 Subpart F), which includes ground water monitoring, sampling, analysis, and data evaluation. Evaporation ponds must also be inspected at a sufficient frequency to assure integrity and compliance with 40 CFR 267.10. Existing wells, sampling and inspections may be incorporated under other programs.

3.3 ALTERNATIVE 3 - IDENTIFY AND ELIMINATE KNOWN SOURCES AND PUMP AND TREAT WITH EXISTING AA/GAC TREATMENT SYSTEM

3.3.1 DESCRIPTION

Alternative 3 would involve identification and removal of known sources where practical. These sources would include floor drains in basements and storm water runoff from diked areas into the sump. Reducing the sources that flow to the sump would reduce water accumulating in the sump. A three-phased approach would be used to facilitate completion of this action.

Phase I would be the engineering field survey which has two objectives. The first objective is to identify potential locations for capping the pipelines leading to Sump 1727 in order to eliminate or minimize inflow to the sump. The other objective is to determine the consequences of capping these pipelines, such as buildup of water in building basements. Based on North Plant drawings the potential source areas for inflow into the sump have been identified as the floor drains in the basements of seven buildings (Buildings 1501, 1503, 1506, 1601, 1603, 1606, and 1701) and the drains in the two tank farm areas (Tanks 1403-1405, 1502, 1507, 1508, and Tank 1402). The potential sources are shown in Figure 3.3-1.

In Phase II, the sources of inflow identified in the field survey would be sampled and analyzed. The objective of the sampling is to chemically

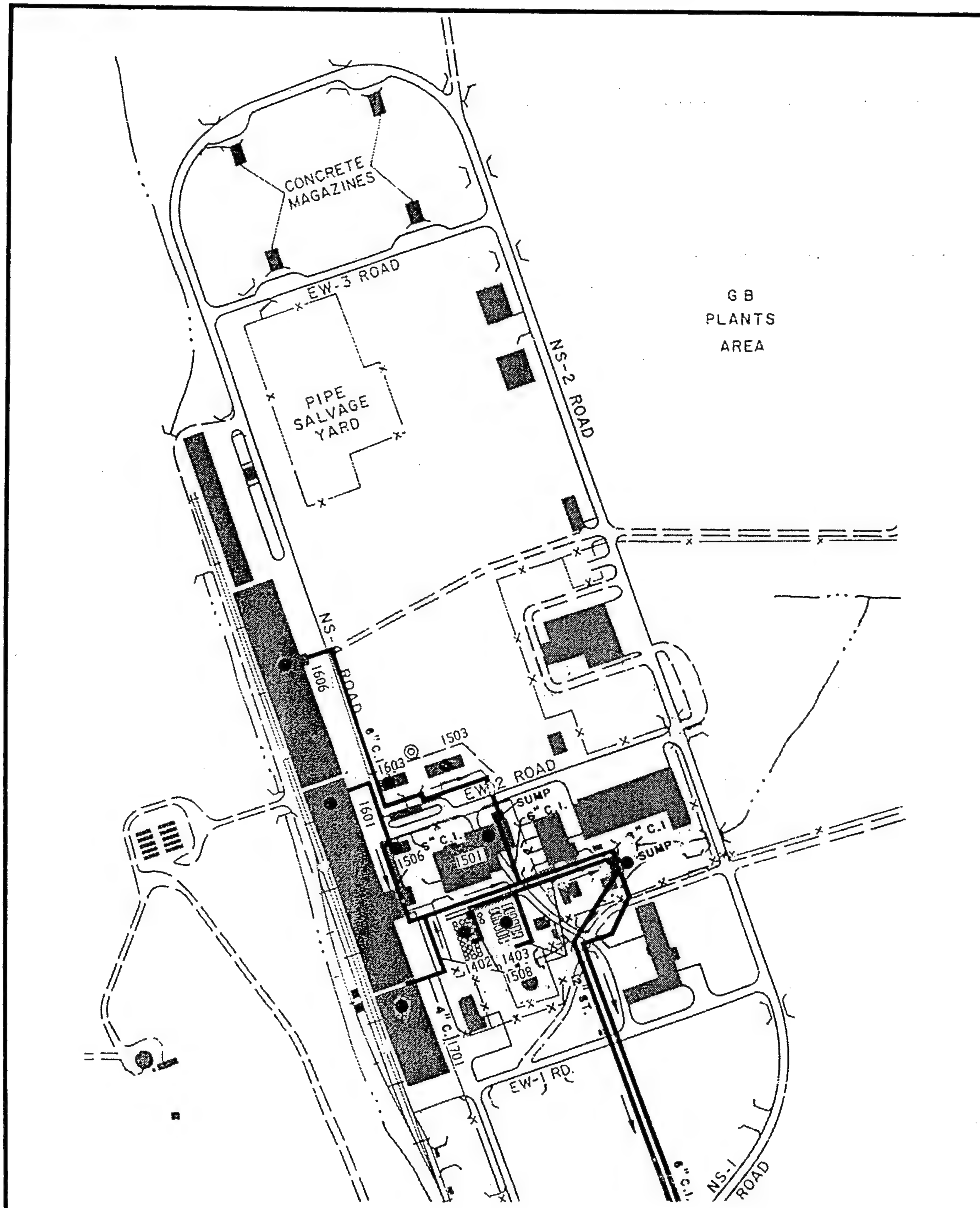

Figure 3.3-1
POTENTIAL SOURCE AREAS
SOURCE: ESE, 1987

Prepared for:
U.S. Army Program Manager's Office For Rocky Mountain Arsenal
Aberdeen Proving Ground, Maryland

characterize the sources of inflow to Sump 1727, and determine which sources are contributing the contaminated water and which are contributing the bulk of the volume. This IRA would attempt to eliminate the highly contaminated sources and the sources that are contributing the most volume.

Finally, in Phase III, the identified and chemically characterized sources of inflow to Sump 1727 would be eliminated. These activities would primarily involve removal of the water at the sources and the plugging of basement floor drains. Sources identified in Phase II that can not be eliminated would still drain to the sump. The existing AA/GAC treatment system described in Section 3.1 would be utilized to treat the water removed from the sources and the water eventually accumulating at the eliminated source areas. The treatment system would also be necessary to treat water pumped from the sump to prevent overflow. Treated effluent disposal options discussed in Section 3.1 remain the same for this IRA.

3.3.2 EFFECTIVENESS

Removal of the identified sources may reduce the amount of inflow into the sump. The volume of water accumulating would be reduced if sources of uncontaminated water are sealed off from the sump. The toxicity of the water accumulating in the sump may be reduced if small sources of highly contaminated water are eliminated. These sources should be eliminated if they are contributing most of the contamination. This IRA addresses the toxicity of the water accumulating at the sources, and the mobility of Sump 1727 water. The toxicity of the water at the eliminated sources would be reduced by removal and treatment. Continuous removal and treatment of the accumulating water at the eliminated sources would also be necessary to prevent release of potentially contaminated water. Water accumulating in Sump 1727 would also need to be pumped to the treatment system to prevent over filling and the release of potentially contaminated water. Managing the level of the sump, so very little water remains in the sump will reduce the possibility of water seeping through the walls. This IRA would not address the possibility of contaminated water migrating from broken pipelines, precipitation, and/or ground water accumulating in broken lines and flowing into the sump.

3.3.3 COST

Alternative 3 is estimated to have a capital cost of $324,000 and includes a field survey, sampling, water removal and treatment, and capping identified sources. The cost breakdown is presented in Table 3.3-1. Planning, management, safety, and analytical costs are also included in the estimated capital cost along with a 20 percent contingency. Analytical costs include chemical characterization of nine soil and nine water samples.

The annual cost for this alternative is estimated to be $52,000 and includes a 20 percent contingency. These costs are listed in Table 3.3-1 and include pumping, storage and treatment costs to remove water from basements and diked areas and address water that may still overflow from the sump. Also included in the annual cost are management and operation labor, chemicals, supplies, analytical costs, data management, and miscellaneous equipment replacement. The present worth of this interim response action is approximately $519,000 for a period of 5 years and a 10 percent interest rate.

3.3.4 IMPLEMENTATION

Identifying, chemically characterizing, and eliminating known sources would take approximately 6 to 9 weeks after contract award. This estimate does not include delays caused by scheduling or weather. Actions required prior to elimination of sources include removal of water. These actions would involve pumping the water into tanks and treating the water for discharge into the sanitary sewer. The treatment system has already been implemented so additional time would not be significant to pump treat and dispose of the water.

3.4 ALTERNATIVE 4 - DECOMMISSION SUMP AND ASSOCIATED LINES AND PUMP AND TREAT WITH EXISTING AA/GAC TREATMENT SYSTEM

3.4.1 DESCRIPTION

Decommissioning the sump and associated lines would entail identifying and eliminating the sources of water flowing into Sump 1727. These sources would include floor drains in basements and storm water runoff from diked areas. Prior to decomissioning the sump and associated lines, the water in the sump and at the sources would be removed and treated with the existing

TABLE 3.3-1 IDENTIFY AND ELIMINATE KNOWN SOURCES AND PUMP AND TREAT WITH EXISTING AA/GAC TREATMENT SYSTEM COST ESTIMATE

DESCRIPTION	QUANTITY	UNITS	UNIT COST ($)	TOTAL COST ($)
CAPITAL COSTS				
** ADMINISTRATION **				
PLANNING (LABOR)	100	HR	50	5,000
MANAGEMENT (LABOR)	40	HR	50	2,000
** ACTIVITIES **				
INITIAL FIELD ACTIVITIES				
FIELD SURVEY & SAMPLING	80	HR	50	4,000
SAFETY	40	HR	50	2,000
ANALYTICAL				
SOIL (ALL COMPOUNDS)	9	SAMPLE	1,500	13,500
WATER (ALL COMPOUNDS)	9	SAMPLE	1,500	13,500
DATA MANAGEMENT	8	HR	50	400
ELIMINATION OF IDENTIFIED SOURCES				
SAFETY	100	HR	50	5,000
** MATERIALS & IMPLEMENTATION **				
REMOVE & TREAT WATER (2) (From Table 3.1-1)	--	--	--	214,140
TRANSER PUMPS	5	EACH	500	2,500
MISC. PIPING/FITTINGS/VALVES	--	--	--	3,000
ELIMINATION OF IDENTIFIED SOURCES				
CAPPING PIPELINE (INCLUDES MATERIAL)	100	HR	50	5,000
		SUBTOTAL		$270,040
		20% CONTINGENCY		$54,008
		TOTAL CAPITAL COSTS		$324,048
ANNUAL COSTS (1)				
PUMP & TREAT ACCUMULATING WATER (From Table 3.1-1)	--	--	--	42,828
		SUBTOTAL		$42,828
		20% CONTINGENCY		$8,566
		TOTAL ANNUAL COSTS		$51,394

PRESENT WORTH FOR 5 YEARS AND 10 PERCENT INTEREST:

PW = $518,871

(1) Based on 60,000 gallons of water per year.
(2) Based on 300,000 gallons of water currently in sump and upstream sources.

SOURCE: ESE, 1988

AA/GAC treatment system described in Section 3.1. Alternative 4 would eliminate water accumulating and possibly overflowing from the sump and would remove water accumulating at the sources once the sump is decomissioned. This IRA is an expansion on Alternative 3 and additionally requires the removal of the sump and associated pipelines. A three-phased approach would again be used to facilitate completion of the alternative.

Phase I would include the engineering field survey, water removal and treatment. Prior to the survey, water in the potential source areas, Sump 1727 and the associated pipelines would be removed and treated. The objectives of the survey would be to identify sources of inflow to the sump, and determine consequences of removing and capping pipelines, such as buildup of water in building basements. Based on North Plant drawings the potential source areas for inflow into the sump have been identified as the floor drains in the basements of seven buildings (Buildings 1501, 1503, 1506, 1601, 1603, 1606, and 1701) and drains in the two tank farm areas (Tanks 1403-1405, 1502, 1507, 1508, and Tank 1402).

In Phase II, the sources of inflow that present problems when isolated from Sump 1727 would be evaluated. These sources would be sampled to characterize the water that would need to be addressed once the sump and the associated lines were eliminated. Sampling and analysis may indicate that a source leading to the sump is not contributing contaminated water. Chemically characterizing the sources would also identify contaminated waters that would continue to accumulate and require actions once the sump is decommissioned. These actions may include removal, storage or treatment of contaminated water accumulating in building basements or diked areas.

In the third and final phase, all sources of inflow to Sump 1727 identified and evaluated in the previous phases would be capped. Water accumulating at sources identified as potential problems would be continuously pumped and treated in the AA/GAC treatment system until final remediation. The pipelines leading from all the sources would be removed and capped. Phase III activities would include the removal and demolition of the sump and associated pipelines. The resulting debris and pipeline would be disposed

of on-site to be dealt with later in the final site-wide cleanup. Clean fill would be used for backfill material.

3.4.2 EFFECTIVENESS

This alternative would be effective in eliminating sources of inflow to the sump. The volume of water accumulating in the sump would be eliminated by isolating the sources, and decommissioning the sump and the associated lines. The possibility of releasing contaminated water would be reduced by preventing water from migrating from broken pipelines. This IRA also reduces the toxicity of the water accumulating at the sources. Water backing up in basements as a result of the elimination of the sump would be removed, treated and discharged. Finally, this IRA would facilitate the final site remediation.

3.4.3 COST

Decommissioning the sump and associated lines is estimated to have a capital cost of $368,000 and includes a 20 percent contingency. The capital costs for this action are presented in Table 3.4-1. Costs include planning, management, safety, a field survey, water removal, analytical costs, sampling, excavation, demolition, capping and backfill. Laboratory costs for nine soil and nine water samples are also included to characterize the sources that could accumulate water once the sump and associated lines are decommissioned. Costs to remove sludge from the basements, diked areas, and the sump are not included. However, cost to store, treat, analyze, and dispose of the water were included. During the field survey, if more than the nine previously mentioned sources flowing to Sump 1727 are identified, excavation, demolition and capping costs may increase.

The annual cost for Alternative 4 is estimated to be $52,000 and includes a 20 percent contingency. Annual costs associated with this interim action are based on 60,000 gal of water accumulating per year requiring treatment. Other actions taken to address water accumulation at the sources may have different annual costs. The annual costs are listed in Table 3.4-1 and include management, analytical costs, data management, chemicals, supplies, operation labor, AA and GAC storage, and miscellaneous equipment replacement. The present worth of this IRA is approximately $563,000 for a period of 5 years and a 10 percent interest rate.

TABLE 3.4-1 DECOMMISSION SUMP AND ASSOCIATED LINES AND PUMP AND TREAT WITH EXISTING AA/GAC TREATMENT SYSTEM COST ESTIMATE

DESCRIPTION	QUANTITY	UNITS	UNIT COST ($)	TOTAL COST ($)
CAPTIAL COSTS				
** ADMINISTRATION **				
PLANNING (LABOR)	120	HR	50	6,000
MANAGEMENT (LABOR)	40	HR	50	2,000
** ACTIVITIES **				
INITIAL FIELD ACTIVITIES				
FIELD SURVEY & SAMPLING	80	HR	50	4,000
SAFETY	40	HR	50	2,000
ANALYTICAL				
SOIL (ALL COMPOUNDS)	9	SAMPLE	1,500	13,500
WATER (ALL COMPOUNDS)	9	SAMPLE	1,500	13,500
DATA MANAGEMENT	8	HR	50	400
DECOMMISSIONING SUMP & LINES				
SAFETY	120	HR	50	6,000
** MATERIALS & IMPLEMENTATION **				
REMOVE & TREAT WATER (2) (From Table 3.1-1)	--	--	--	214,140
TRANSER PUMPS	5	EACH	500	2,500
MISC. PIPING/FITTINGS/VALVES	--	--	--	3,000
DECOMMISSIONING SUMP & LINES				
EXCAVATION/DEMOLITION/ONSITE STORAGE				
PIPELINE	280	LN FT	5.05	1,414
SUMP	1550	SQ FT	21.32	33,046
CAPPING PIPELINE	80	HRS	50	4,000
BACKFILL	400	CU YD	1.71	684
		SUBTOTAL		$306,184
		20% CONTINGENCY		$61,237
		TOTAL CAPITAL COST		$367,421
ANNUAL COSTS (1)				
PUMP & TREAT ACCUMULATING WATER (From Table 3.1-1)	--	--	--	42,828
		SUBTOTAL		$42,828
		20% CONTINGENCY		$8,566
		TOTAL ANNUAL COSTS		$51,394

PRESENT WORTH FOR 5 YEARS AND 10 PERCENT INTEREST:

PW = $562,244

(1) Based on 60,000 gallons of water per year.
(2) Based on 300,000 gallons of water currently in sump and upstream sources.

SOURCE: ESE, 1988

3.4.4 IMPLEMENTATION

Decommissioning the sump and associated lines would take 2 to 3 months after contract award. This estimate does not take into account delays caused by scheduling, weather, or equipment failures. In order to implement this action, building basements, diked areas, and pipelines as well as the sump would require draining.

3.5 ALTERNATIVE 5 - CONSTRUCT A NEW SUMP AND PUMP AND TREAT WITH EXISTING AA/GAC TREATMENT SYSTEM

3.5.1 DESCRIPTION

Alternative 5 includes construction of a replacement sump and installation of new 6-inch diameter, polyvinyl-chloride (PVC) piping to replace existing pipelines. The new sump would have the same dimensions and be constructed of the same materials as its predecessor. However, it would not be equipped with the pumps for the transfer of the sump water to the Spray Dryer. This action would require water removal and treatment prior to construction to address water in the sump and potential sources areas. During construction of a new sump, water at the sources would need to be removed and treated. A phased approach would be used to conduct this IRA.

Phase I, would include an engineering field survey and water removal and treatment. The objectives of the survey would be to identify sources of inflow to the sump, and determine consequences of replacing pipelines, such as buildup of water in building basements during replacement. Based on North Plant drawings the potential source areas for inflow into the sump have been identified as the floor drains in the basements of seven buildings (Buildings 1501, 1503, 1506, 1601, 1603, 1606, and 1701) and drains in the two tank farm areas (Tanks 1403-1405, 1502, 1507, 1508, and Tank 1402).

Phase II activities would include the removal of the sump and associated pipeline, the construction of a replacement sump, and the installation of a new pipeline system. The debris and pipeline removed by these operations would be disposed of on-site, and dealt with in the final site-wide cleanup. During construction, water would be pumped from the sources and treated in the existing treatment system. Once the new sump is completed, water can

again accumulate in the sump. To prevent over filling, the water from the sump would be pumped to the existing AA/GAC treatment system and discharged.

3.5.2 EFFECTIVENESS

This action would reduce the potential for contamination by ensuring contaminated water is not seeping from the sump walls or flowing from broken pipes. This action would also address the possible problem of potentially contaminated water overflowing from the new sump. Contaminated water would be removed from the sources during construction and from the sump upon completion of the new sump, reducing the possibility of migration of contamination. The toxicity of the contaminated water would be addressed by this IRA. The existing AA/GAC treatment system will remove As, F, trace organics and suspended solids, thereby reducing the volume of contaminated water. This alternative would facilitate the final site remediation action by removing the old sump and the associated pipelines. Furthermore, replacing the old sump with a new one ensures that a usable sump would be available for final remediation of the buildings at the North Plants.

3.5.3 COST

The new sump is estimated to have a capital cost of $366,000. The costs developed for this IRA include planning, design, management, a survey, water removal and treatment, safety, analytical costs, excavation, demolition, construction, materials and installation. The costs for this action are presented in Table 3.5-1. Excavation, demolition, construction, materials and installation costs are from the 1987 Means Cost Data. All other figures are from average contractor labor and service rates, and actual costs to pump and treat the contaminated water.

The annual cost associated with this alternative is estimated to be $52,000. This estimate is based on treating 60,000 gallons of water per year. The annual costs are listed in Table 3.5-1 and include operation and management labor, chemicals, supplies, analytical costs, data management, AA and GAC storage, and miscellaneous equipment replacement. The present worth of Alternative 5 is approximately $561,000 for a period of 5 years and a 10 percent interest rate.

TABLE 3.5-1 CONSTRUCT NEW SUMP AND PUMP AND TREAT WITH EXISTING AA/GAC TREATMENT SYSTEM COST ESTIMATE

DESCRIPTION	QUANTITY	UNITS	UNIT COST ($)	TOTAL COST ($)
CAPITAL COSTS				
** ADMINISTRATION **				
PLANNING (LABOR)	150	HR	50	7,500
DESIGN (LABOR)	120	HR	50	6,000
MANAGEMENT (LABOR)	100	HR	50	5,000
** ACTIVITIES **				
INITIAL FIELD ACTIVITIES				
FIELD SURVEY & SAMPLING	80	HR	50	4,000
SAFETY	40	HR	50	2,000
INSTALLATION OF NEW SUMP				
SAFETY	240	HR	50	12,000
** MATERIALS & IMPLEMENTATION **				
REMOVE & TREAT WATER (2) (From Table 3.1-1)	--	--	--	214,140
TRANSER PUMPS	5	EACH	500	2,500
MISC. PIPING/FITTINGS/VALVES	--	--	--	3,000
EXCAVATION/DEMOLITION/ONSITE STORAGE				
PIPLINE	280	LN FT	5.05	1,414
SUMP	1,550	SQ FT	21.32	33,046
NEW PIPELINE				
6" DIA PVC	280	FT	3.08	862
FITTING, BENDS	30	EACH	52	1,560
TEES	5	EACH	75	375
NEW SUMP				
FORMS IN PLACE	135	SFCA	2.66	359
CONCRETE	60	CU YD	79	4,740
STEEL PLANKS	380	SQ FT	15.47	5,879
WATER PROOFING	380	SQ FT	1.24	471
		SUBTOTAL		$304,846
		20% CONTINGENCY		$60,969
		TOTAL CAPITAL COST		$365,816
ANNUAL COSTS (1)				
PUMP & TREAT ACCUMULATING WATER (From Table 3.1-1)	--	--	--	42,828
		SUBTOTAL		$42,828
		20% CONTINGENCY		$8,566
		TOTAL ANNUAL COSTS		$51,394

PRESENT WORTH FOR 5 YEARS AND 10 PERCENT INTEREST:

PW = $560,638

(1) Based on 60,000 gallons of water per year.
(2) Based on 300,000 gallons of water currently in sump and upstream sources.

SOURCE: ESE, 1988

3.5.4 IMPLEMENTATION

This interim action would take approximately 3 to 4 months after contract award to complete, not including delays due to scheduling, weather, or equipment failure. Water in the sump and building basements would need to be removed prior to implementation of the field survey.

3.6 ALTERNATIVE 6 - RETROFIT EXISTING SUMP AND PUMP AND TREAT WITH EXISTING AA/GAC TREATMENT SYSTEM

3.6.1 DESCRIPTION

Retrofitting the existing sump would include the installation of a HDPE liner and reinforcement shoring. This IRA would also verify the integrity of the sump and would repair damages to the sump. This action would require sump water removal and treatment prior to installation of the HDPE liner or integrity verification. During installation, water accumulating at potential source areas will be pumped to the existing treatment system for treatment. A phased approach would be used to conduct this alternative. Once the sump has been retrofitted, over filling would be prevented by pumping the water to the AA/GAC system.

In Phase I, the water in sump 1727 would be removed and treated and an engineering field survey would be conducted. The condition of the sump would directly affect this action, so a field survey would be conducted to evaluate the sump's condition. The sump may be in such a state where repairing it and retrofitting it with a liner would be impossible. If the sump is not repairable, then this IRA will not be considered.

A preliminary field survey was conducted to evaluate the condition of the visible sump walls. The water level in the sump was approximately 7 1/2 ft, exposing approximately 10 ft of the sump. The exposed walls appear to be in fairly good condition, but were not fully assessable (ESE, 1988). A field survey should be conducted again once the sump is emptied, to evaluate the conditions of the entire sump in more detail.

Phase II activities would include concrete repair and reinforcement of the walls. The type and quantity of reinforcement the sump would require would be difficult to predict, however, for this report reinforcement would include steel plates and I-beams to shore up the sides.

A HDPE liner would be installed in Phase III. Installation of the liner would require approximately 30 percent additional material to line the sump. During Phases I, II, and III potential sources of contaminated water will be removed at the sources and treated in the AA/GAC system. This will reduce the possibility of contamination migration and minimize the potential exposure of workers to contaminated water. Once the sump has been retrofitted, the existing treatment system would be used to treat water pumped to prevent sump over filling.

3.6.2 EFFECTIVENESS

The retrofitted sump would reduce the chance of contaminated water being released to the environment by preventing water from seeping through the sump walls and over filling. The existing treatment system would remove As, F, trace organics and suspended solids, thereby reducing the toxicity and volume of contaminated water. Besides eliminating seepage, the retrofitted sump may be used during final remediation.

This IRA would prevent overtopping, address the water accumulating in the sump, and ensure that the water accumulating in the sump would not seep out. However, this IRA may not be implementable due to the condition of the sump or may not prolong the life of the sump long enough to be cost effective.

Finally, this IRA would not address broken pipes. Precipitation accumulating at possible breaches may add additional water to the sump and may be a primary source of water flowing into the sump. On the other hand, contaminated water may be flowing from broken lines into the surrounding soil.

3.6.3 COST

Costs for repairing and retrofitting the sump depend on the condition of the sump. Therefore, the assumption that the sump requires only minimal repairs including reinforcing the structure, concrete patching, and installation of a liner has been used to develop costs.

The capital costs developed and considered for this IRA include water removal and treatment, an engineering field inspection, concrete patching

and repair, reinforcement, and installation of a HDPE liner. These costs can be seen in Table 3.6-1. The estimated capital cost of this IRA is approximately $339,000. Management, design and planning costs were also considered. Safety costs are included for work that would be performed within the sump because of the confined working space and possible exposure to hazardous compounds.

The costs in Table 3.6-1 do not include removal or disposal of sludge from the sump. Cleaning costs depend on the condition of the sump and therefore, are not included. Costs associated with rerouting water while repair and retrofitting are performed are included.

The annual cost for Alternate 6 is estimated to be $52,000. This estimate is based on pumping and treating 60,000 gallons of water per year. The annual costs are listed in Table 3.6-1 and include operation and management labor, chemicals, suppliers, analytical costs, data management, AA/GAC storage, and miscellaneous equipment replacement. The present worth of Alternative 6 is approximately $534,000 for a period of 5 years and a 10 percent interest rate.

3.6.4 IMPLEMENTATION

The sump would need to be emptied, cleaned, and inspected before retrofitting and repair can be implemented. Water may be pumped into storage tanks, treated and discharged, if the field inspection indicates that the sump cannot be repaired and is structurally unsound.

This IRA would take approximately 2 to 3 months to complete after contract award. This estimate does not include delays due to scheduling, weather, or equipment failure.

Another factor that may delay completion of this IRA is the condition of the sump. If the sump is repairable but in poor condition it would take longer to implement this IRA.

TABLE 3.6-1 RETROFIT EXISTING SUMP AND PUMP AND TREAT WITH EXISTING AA/GAC TREATMENT SYSTEM COST ESTIMATE

DESCRIPTION	QUANTITY	UNITS	UNIT COST ($)	TOTAL COST ($)
CAPITAL COSTS				
** ADMINISTRATION **				
PLANNING (LABOR)	80	HR	50	4,000
DESIGN (LABOR)	120	HR	50	6,000
MANAGEMENT (LABOR)	80	HR	50	4,000
** ACTIVITIES **				
INTEGRITY FIELD INSPECTION	40	HR	50	2,000
SAFETY	200	HR	50	10,000
** MATERIALS & IMPLEMENTATION **				
REMOVE & TREAT WATER (2) (From Table 3.1-1)	--	--	--	214,140
TRANSER PUMPS	5	EACH	500	2,500
MISC. PIPING/FITTINGS/VALVES	--	--	--	3,000
HDPE LINER (30 % EXTRA FOR INSTALLATION)	4,100	SQ FT	5	20,500
CONCRETE PATCHING				
FLOOR/EPOXY GROUT	600	SQ FT	4.28	2,568
WALLS/EPOXY GROUT	2540	SQ FT	2.58	6,553
REINFORCEMENT				
3/8" STEEL PLATES	300	SQ FT	6.46	1,938
DRILLING & ANCHORING	300	SQ FT	2.6	780
I BEAMS (W 25#/LN FT)	3.2	TON	1,118	3,578
WELDS	40	LN FT	25	1,000
		SUBTOTAL		$282,557
		20% CONTINGENCY		$56,511
		TOTAL CAPITAL COSTS		$339,068
ANNUAL COSTS (1)				
PUMP & TREAT ACCUMULATING WATER (From Table 3.1-1)	--	--	--	42,828
		SUBTOTAL		$42,828
		20% CONTINGENCY		$8,566
		TOTAL ANNUAL COSTS		$51,394

PRESENT WORTH FOR 5 YEARS AND 10 PERCENT INTEREST:

PW = $533,891

(1) Based on 60,000 gallons of water per year.
(2) Based on 300,000 gallons of water currently in sump and upstream sources.

SOURCE: ESE, 1988

3.7 ALTERNATIVE 7 - DIRECT DISCHARGE TO SURFACE WATERWAYS

This IRA would be the no-action scenario. Water accumulating and eventually overflowing from the sump would not be treated or stored. It would spill into the adjacent ditch and head toward First Creek. The water in the ditch would probably not reach First Creek because the flow rate would be very small. Most of the water released would probably be absorbed into the soil.

This IRA would not reduce mobility, toxicity or volume, but there are no costs or implementation requirements associated with it.

4.0 INTERIM RESPONSE ACTION EVALUATION

Each IRA discussed in Section 3.0 demonstrates varying degrees of effectiveness to reduce mobility, toxicity, or volume. This information is summarized in Table 4.0-1 as advantages (+) and disadvantages (-). Some of the advantages and disadvantages discussed in Section 3.0 and shown in Table 4.0-1 would be the result of actions outside the scope of this IRA.

Costs developed for each IRA are also summarized in the table. A present worth was calculated for each action so order of magnitude cost could be compared. Implementation requirements are also summarized in Table 4.0-1. They include estimated times to completion and implementation requirements.

Most of the IRAs effectively reduce mobility, toxicity, or volume. A few IRAs reduce only one or two of these criteria with the no action alternative addressing none of them. Each of the IRA discussed, except Alternative 7 effectively attains the desired objective to mitigate any remaining threat of release of liquids from Sump 1727.

TABLE 4.0-1 INTERIM RESPONSE ACTION SUMMARY (Page 1 of 3)

INTERIM RESPONSE ACTION	EFFECTIVENESS TO REDUCE			COST			IMPLEMENTATION
	MOBILITY	TOXICITY	VOLUME	CAPITAL	ANNUAL	PW*	
1. PUMP AND TREAT WITH EXISTING AA/GAC TREATMENT SYSTEM	+ Prevents overflow. + Sump water level management addresses contaminated water possibly seeping through sump walls. - Does not address potentially contaminated water migrating from upstream sources. - Does not address contaminated water possibly flowing from broken pipelines.	+ Removes As, F, and trace organics from water. + Removes particulates including Cd and Pb suspended solids. - Does not directly treat water from upstream sources.	+ Reduces amount of contaminated media by adsorbing contamination from water to AA and GAC.	$0	$52,000	$195,000	The system is set up in Building 1713 and can be implemented almost immediately. Modifications for discharge would need to be made.
2. EVAPORATION POND	+ Prevents overflow. + Sump water level management addresses contaminated water possibly seeping through sump walls. - Does not address potentially contaminated water migrating from upstream sources. - Does not address contaminated water possibly flowing from broken pipelines. - May cause volatile organic emissions or airborne dust problems.	- Does not reduce toxicity, however, the contamination will be concentrated unless it evaporates along with the water. - Does not directly address water from upstream sources.	+ Reduces volume by natural evaporation.	$119,000	$42,000	$275,000	Implementation is estimated to take 2 to 3 months after contract award. Installation of the liner would need to be done during spring or summer.

\+ Advantages
\- Disadvantages
* Present Worth for 5 years and 10 percent interest.

SOURCE: ESE, 1988

TABLE 4.0-1 INTERIM RESPONSE ACTION SUMMARY (Page 2 of 3)

	EFFECTIVENESS TO REDUCE			COST			
INTERIM RESPONSE ACTION	MOBILITY	TOXICITY	VOLUME	CAPITAL	ANNUAL	PW*	IMPLEMENTATION
3. IDENTIFY AND ELIMINATE KNOWN SOURCES AND PUMP AND TREAT WITH EXISTING AA/GAC TREATMENT SYSTEM	+ Prevents overflow. + Sump water level management addresses contaminated water possibly seeping through sump walls. + Prevents potentially contaminated water migrating from upstream sources during IRA and addresses water that will accumulate at the eliminated sources. - Does not address contaminated water possibly flowing from broken pipelines.	+ Removes As, F, and trace organics from water. + Removes particulates including Cd and Pb suspended solids. + Removes contaminated water from sump and upstream sources and reduces contamination.	+ Reduces amount of contaminated media by adsorbing contamination from water to AA and GAC.	$324,000	$52,000	$519,000	Implementation is estimated to take 6 to 9 weeks after contract award. Water would need to be removed from the sources. The treatment system is set up in Building 1713 and can be implemented almost immediatedly. Modifications to include upstream sources and discharge will need to be made.
4. DECOMISSION SUMP AND ASSOCIATED LINES AND PUMP AND TREAT WITH EXISTING AA/GAC TREATMENT SYSTEM	+ Prevents overflow. + Eliminates water possibly seeping through the sump walls + Prevents potentially contaminated water migrating from upstream sources during IRA and addresses water that will accumulate at the sources once the sump and associated lines are decomissioned. + Eliminates water possibly flowing from broken pipes.	+ Removes As, F, and trace organics from water. + Removes particulates including Cd and Pb suspended solids. + Removes contaminated water from sump and upstream sources and reduces contamination.	+ Reduces amount of contaminated media by adsorbing contamination from water to AA and GAC. + May reduce the volume of water if groundwater is directly infiltrating the sump or if precipitation is accumulating in broken pipelines.	$368,000	$52,000	$563,000	Implementation is estimated to take 2 to 3 months after contract award. Water would need to be removed from the upstream sources and the sump. The treatment system is set up in Building 1713 and can be implemented almost immediatedly. Modifications to include upstream sources and discharge will need to be made.

\+ Advantages
\- Disadvantages
* Present Worth for 5 years and 10 percent interest.

SOURCE: ESE, 1988

TABLE 4.0-1 INTERIM RESPONSE ACTION SUMMARY (Page 3 of 3)

INTERIM RESPONSE ACTION	EFFECTIVENESS TO REDUCE: MOBILITY	EFFECTIVENESS TO REDUCE: TOXICITY	EFFECTIVENESS TO REDUCE: VOLUME	COST: CAPITAL	COST: ANNUAL	COST: PW*	IMPLEMENTATION
5. CONSTRUCT NEW SUMP AND PUMP AND TREAT WITH EXISTING AA/GAC TREATMENT SYSTEM	+ Prevents overflow. + Eliminates water possibly seeping through the sump walls + Prevents potentially contaminated water migrating from upstream sources during IRA and addresses water that will accumulate in the sump once the new sump is completed. + Eliminates water possibly flowing from broken pipes.	+ Removes As, F, and trace organics from water. + Removes particulates including Cd and Pb suspended solids. + Removes contaminated water from sump and upstream sources and reduces contamination.	+ Reduces amount of contaminated media by adsorbing contamination from water to AA and GAC. + May reduce the volume of water if groundwater is directly infiltrating the sump or if precipitation is accumulating in broken pipelines.	$366,000	$52,000	$561,000	Implementation is estimated to take 3 to 4 months after contract award. Water would need to be removed from the upstream sources and the sump. The treatment system is set up in Building 1713 and can be implemented almost immediatedly. Modifications to include upstream sources and discharge will need to be made.
6. RETROFIT EXISTING SUMP AND PUMP AND TREAT WITH EXISTING AA/GAC TREATMENT SYSTEM	+ Prevents overflow. + Eliminates water possibly seeping through the sump walls. + Prevents potentially contaminated water migrating from upstream sources during IRA and addresses water that will accumulate in the sump and upstream sources once the sump is retrofitted. - Does not address contaminated water possibly flowing from broken pipelines.	+ Removes As, F, and trace organics from water. + Removes particulates including Cd and Pb suspended solids. + Removes contaminated water from sump and upstream sources and reduces contamination.	+ Reduces amount of contaminated media by adsorbing contamination from water to AA and GAC. + Reduces volume of water if groundwater was directly infiltrating the sump.	$339,000	$52,000	$534,000	May not be implementable. If implementable, it would take approximately 2 to 3 months after contract award to retrofit sump. Installation of liner would need to be done during spring or summer. Water would need to be removed from the sump. The treatment system is set up in Building 1713 and can be implemented almost immediatedly. Modifications to include upstream sources and discharge will need to be made.
7. DIRECT DISCHARGE TO SURFACE WATERWAYS	- Does not address mobility.	- Does not address toxicity.	- Does not address volume.	$0	$0	$0	No implementation requirements.

+ Advantages
- Disadvantages
* Present Worth for 5 years and 10 percent interest.

SOURCE: ESE, 1988

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APPENDIX A
COMMENTS AND RESPONSES TO THE
TASK 30 SUMP 1727 INTERIM RESPONSE ACTION
ALTERNATIVES ASSESSMENT DRAFT FINAL REPORT
MAY 1988

The Task 30 Sump 1727 Interim Response Action Alternatives Assessment Draft Final Report was distributed in May 13, 1988 to all Organizations and State (OAS). Comments were received from the U.S. Environmental Protection Agency (EPA) on June 9, 1988 and U.S. Fish and Wildlife Service on June 6, 1988. Comments were received from Shell Oil Company and Colorado Department of Health (CDH) after the close of the comment period. There is insufficient time available in the IRA process to respond to late comments in the final alternatives assessment. However, the concerns of Shell and CDH have been considered during finalization of the alternatives assessment and as the draft decision document is being prepared. The continuing investigation of the sources of contamination at Sump 1727 has produced additional information which has been added to the text of the final alternatives assessment. This information answers many of the concerns expressed by CDH.

All specific written comments and the responses to EPA and USFWS comments are contained in the following appendix.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VIII
999 18th STREET - SUITE 500
DENVER, COLORADO 80202-2405

JUN 0 9 1988

Ref: 8HWM-SR

Colonel W. N. Quintrell,
Program Manager
Office of the Program Manager for
Rocky Mountain Arsenal
ATTN: AMXRM-PM
Building E4460
Aberdeen Proving Ground, Maryland 21010-5401

Re: Rocky Mountain Arsenal, (RMA), Task 30, Sump 1727 Interim Response Action, Alternatives Assessment, Draft Final Report, May, 1988.

Dear Colonel Quintrell:

We have reviewed the above referenced report and have the enclosed comments. Please contact Mr. Connally Mears at (303) 293-1528, if there are questions on this matter.

Sincerely yours,

Robert Duprey, Director
Hazardous Waste Management Division

Enclosure

cc: Thomas P. Looby, CDH
David Shelton, CDH
Lt. Col. Scott P. Isaacson
Chris Hahn, Shell Oil Company
R. D. Lundahl, Shell Oil Company
Thomas Bick, Department of Justice
David Anderson, Department of Justice
Mike Witt, ESE

GENERAL COMMENTS ON TASK 30, SUMP 1727
INTERIM RESPONSE ACTION ALTERNATIVES ASSESSMENT
DRAFT FINAL REPORT, MAY, 1988

1. This alternative assessment presentation effectively incorporated the components outlined in the Consent Decree (i.e, implementability, costs, etc.). We would like to see this same format followed in future assessments.

2. Individual IRA measures which cannot remediate the problem should not be presented as separate alternatives but as part of a combination of procedures which result in successful control measures.

3. Alternative 4, pages 3-16 and 3-17, This action, decommissioning the sump and associated lines, would require draining of the sump and building basements. This cost should be included on page 3-16, to more adequately reflect initial capital expenditure.

**RESPONSES TO
ENVIRONMENTAL PROTECTION AGENCY COMMENTS ON THE
TASK 30 SUMP 1727 INTERIM RESPONSE ACTION
ALTERNATIVES ASSESSMENT DRAFT FINAL REPORT
MAY 1988**

Comment 1: This alternative assessment presentation effectively incorporated the components outlined in the Consent Decree (i.e., implementability, costs, etc.). We would like to see the same format followed in future assessments.

Response: No response necessary.

Comment 2: Individual IRA measures which cannot remediate the problem should not be presented as separate alternatives but as part of a combination of procedures which result in successful control measures.

Response: We agree. The IRA measures which could not address the problem and reduce the possibility of contamination migrating into the environment should not be presented as separate alternatives. The previous alternatives have been combined into IRA alternatives which would successfully reduce the possibility of contamination migrating into the environment. The alternatives include:

- Pump and treat with existing AA/GAC treatment system;
- Evaporation pond;
- Identify and eliminate known sources and pump and treat potentially contaminated water;
- Decommission sump and associated lines and pump and treat potentially contaminated water;
- Construct a new sump and pump and treat potentially contaminated water;
- Retrofit existing sump and pump and treat potentially contaminated water; and
- Direct discharge to surface waterways.

Comment 3: Alternative 4, pages 3-16 and 3-17, this action, decommissioning the sump and associated lines, would require draining of the sump and building basements. This cost should be included on Page 3-16, to more adequately reflect initial capital expenditure.

Response: We agree. Costs for any IRA that would require draining of the sump, building basements, or diked areas should be included. The cost estimates included in this report assume 300,000 gallons are presently in the sump and upstream sources, and that 60,000 gallons would accumulate and require removal and treatment each year.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
FISH AND WILDLIFE ENHANCEMENT
COLORADO STATE OFFICE
529 25½ Road, Suite B-113
GRAND JUNCTION, COLORADO 81505
(303) 243-2778

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:

June 6, 1988

Mr. Gary Briggs
Program Manager's Office
Building 111
Rocky Mountain Arsenal
Commerce City, CO 80022

Dear Mr. Briggs:

We have reviewed the building 1727 Sump Interim Response Action Draft Applicable or Relevant and Appropriate Requirements Document. Our only recommendation is that a screen or grate should be placed over the opening that leads down into the ramp. This would prevent wildlife species (except for small ones) from accidentally falling into the 18 foot deep sump.

Please contact Mr. Rod DeWeese at FTS 776-2675 or (303) 236-2675 for any questions.

Sincerely,

Jeffrey D. Opdycke
State Supervisor

cc: Andrew Kingery, Dept. of Army
Bob McCue, FWS
Tom Jackson, FWS
Bob Stewart, DOI
Connally Mears, EPA
Douglas Reagan, ESE

Briggs

**RESPONSES TO
U.S. FISH AND WILDLIFE SERVICE COMMENTS ON THE
TASK 30 SUMP 1727 INTERIM RESPONSE ACTION
ALTERNATIVES ASSESSMENT DRAFT FINAL REPORT
MAY 1988**

Comment: We have reviewed the building 1727 Sump Interim Response Action Draft Applicable or Relevant and Appropriate Requirements Document. Our only recommendation is that a screen or grate should be placed over the opening that leads down into the ramp. This would prevent wildlife species (except for small ones) from accidentally falling into the 18 foot deep sump.

Response: We agree. Screens have been placed over the openings to the sump to prevent animals from falling into the sump.

1 8 JUN 1988

Shell Oil Company

One Shell Plaza
P.O. Box 4320
Houston, Texas 77210

June 10, 1988

Office of the Program Manager
for Rocky Mountain Arsenal
ATTN: AMXRM-PM: Mr. Donald L. Campbell
Building E-4460
Aberdeen Proving Ground, Maryland 21010-5401

Dear Mr. Campbell:

Enclosed herewith are Shell Oil's comments on the Task 30, Sump 1727 IRA Alternatives Assessment Draft Final Report, May 1988.

Sincerely,

R D Lundahl

R. D. Lundahl
Manager Technical
Denver Site Project

RDL:ajg

Enclosure

cc: (w/enclosure)
Mr. Jeff Edson
Hazardous Materials and Waste Management Division
Colorado Department of Health
4210 East 11th Avenue
Denver, CO 80020

Mr. Connally Mears
Air and Waste Management Division
U.S. Environmental Protection Agency, Region VIII
One Denver Place
999 18th Street, Suite 500
Denver, CO 80202-2405

881301-1/2

SHELL'S COMMENTS ON SUMP 1727 IRA
ALTERNATIVES ASSESSMENT DRAFT FINAL REPORT
TASK 30, MAY 1988

1. Page 1-7, last paragraph.

   In the second sentence and between toxicity and volume should be or.

2. Page 3-1, third paragraph.

   Will the design data develop the information to determine the source and treatment of the cadmium and/or lead?

3. Page 3-2, top of page.

   Is it possible to discharge the treated effluent currently stored in tanks to the Northwest Boundary System?

4. Page 3-8, top of page.

   It is not clear how cleaning will minimize air emissions or how the pond can be cleaned without damaging the liner.

5. Page 3-11, Figure 3.3-1.

   The legend is missing to explain the shaded areas.

881301-2/2

17 JUN REC'D

STATE OF COLORADO

COLORADO DEPARTMENT OF HEALTH

4210 East 11th Avenue
Denver, Colorado 80220
Phone (303) 320-8333

Roy Romer
Governor

Thomas M. Vernon, M.D.
Executive Director

June 9, 1988

Mr. Donald Campbell
Office of the Program Manager
RMA Contamination Cleanup
AMXRM-EE, Building E4460
Department of the Army
Aberdeen Proving Grounds, Maryland 21010-5401

Re: State Comments on Task 30 Sump 1727
Interim Response Action Alternative Assessment
Draft Final Report

Dear Mr. Campbell:

Enclosed are the State's comments on Task 30, Sump 1727 Interim Response Alternative Assessment Draft Final Report. The State's principal concern is that the sources of the liquids and the contamination in the 1727 sump have not been identified. Therefore, it is premature to screen alternatives to remediate an undefined problem.

If you have any questions, please call Jeff Edson with this Division.

Sincerely,

David C. Shelton
Director
Hazardous Materials and
Waste Management Division

DCS:nr

cc: Mike Hope
David Anderson
Chris Hahn
Edward McGrath
Connally Mears
Mike Gaydosh

881308-1/2

STATE COMMENTS ON TASK 30
SUMP 1727 INTERIM RESPONSE ACTION
ALTERNATIVE ASSESSMENT DRAFT FINAL REPORT

General Comments:

1. The Introduction to the Report states that the source of the liquids in the 1727 sump is either the inflow of stormwater run-off; infiltration of groundwater; leaking sewer lines; sediments in building basements; or past tank farm spills. Without identifying the source of the liquids, it is premature to attempt to screen alternatives. Therefore, additional investigations into the sources of the contaminated waters entering the 1727 sump are necessary.

For example, alternative numbers 3 and 4 assume that the source of contaminated waters is floor drains and/or stormwater run-off from diked areas. Comparing information supplied in the Task 24 structure profile regarding the contaminants found in each building with the contaminants known to be in the 1727 sump would eliminate various North Plants buildings as potential sources.

Similarly, introducing chemical stains as tracer compounds into water lines and into the drains of the building and diked areas suspected of being source could also screen out possible source areas. Sampling liquids from building drains and diked areas would also help identify each building's potential contaminants and the building's potential as being a source.

881308-2/5

Without identifying the sources of the contamination in the 1727 sump, the only technology presented that will adequately address the objectives of this interim action is the combination of either alternative 5 or 6 -- retrofitting or construction of a new sump -- with alternative number 1 -- AA/GAC treatment.

2. The report states that it is unknown whether the water entering the sump is actually contaminated or whether the water becomes contaminated when it comes into contact with the sediment in the sump. Therefore, many of the alternatives cannot be screened without emptying the sump, cleaning out and sampling the sediments on the bottom and sides, and defining the integrity of the sump. Without this information, an effective decision as to whether to plug the drains or construct a new sump cannot be made.

3. The report is confusing as to the effectiveness of the activated alumina/granulated activated carbon system. No information is provided as to what modifications to the unit are needed in the event additional inorganics are found in the water or sediment. No data is presented as to the levels of contaminants founds in the effluent discharge. Furthermore, the report does not describe the system's effectiveness at removing trace organics. Additional information is needed on the effectiveness of the AA/GAC before any alternatives can be screened.

Specific Comments:

1. **Page 1-5** - Groundwater infiltration should not be ruled out as a potential source of the contaminated water in the 1727 sump. Groundwater elevations are known to be as high as 5,230 feet in the North Plants area. (See p. 4, Task 42 CAR). Therefore, using only one boring, 25043, to conclude that the sump is not in contact with groundwater is insufficient. Because most of the technologies proposed to perform this interim action are based on remediating the sources of the infiltration into the sump, ruling out groundwater as the source could result in an ineffective interim action.

2. **Page 1-5** - Task 24B investigated and sampled liquids found in basements of structures in the North Plants. Were the results of the Task 24B investigation incorporated into this report?

3. **Page 1-5** - A determination has not been made as to whether the water coming into the 1727 sump is contaminated when it infiltrates the sump, or whether it becomes contaminated upon contact with the sediment in the sump. It is essential to remove and analyze the sediment, and to sample and analyze future infiltrating water. This type of investigation would indicate whether the liquids entering the sump

are uncontaminated if not subjected to the sump's sediment. Cleaning the sump may be all that is needed to reach the objective of this interim action.

4. **Page 1-5** - Why are diked storage areas 1402, 1403, 1405, 1503, 1507, 1508 being investigated as potential sources of the contaminated groundwater entering the 1727 sump? None of the tanks in these areas contained arsenic, lead, fluoride, cadmium or isopropylmethylphosphonate. Further investigations of the sumps and underground storage tanks adjacent to buildings 1501 and 1506 as potential sources are necessary because they contain free-standing liquids and at one time all of the contaminants detected in the 1727 sump were used in those buildings.

5. **Page 1-5** - It is premature to conclude that "the interior walls of the sump appear to be in good condition." Only half of the interior walls have been visually observed. The unobserved lower half of the interior walls are more likely to be deteriorated due to their prolonged contact with the contaminated water. This statement should be deleted or clarified.

6. **Page 1-6** - Knowledge of the condition of the sump's interior is necessary <u>before</u> deciding how to perform this interim

action's objective. Before a Decision Document is issued, the sump should be emptied and cleaned, and an update should be provided to the MOA parties on the integrity of the sump's interior. Only then can an assessment of the alternatives be done.

7. **Page 1-6** - Shutting off the fire protection water at the North Plants could be catastrophic. What contingencies have been made to supply water to the North Plants in the event of a fire?

8. **Page 1-6** - Were any nontarget compounds identified from the sump's sampling in February, 1987? Some of the nontargets could be more site specific than arsenic, fluoride, lead, cadmium, and IMPA. These nontargets could help to better identify potential sources of the contaminated water.

9. **Page 1-7** - The report states that lead and cadmium was not found in the sump's waters in April, 1987. The report also states that the lead and cadmium may have settled to the bottom of the sump. If this is the case, the sediment must be agitated, and additional samples taken to assure that other metals do not exist in the sediment. The activated alumina must be capable of treating the lead and cadmium and any other inorganic contaminant found in the sediment. A

complete analysis of all common inorganics must be done on the liquids to assure that the AA method will, in fact, be effective in adequately treating all inorganics, including nontargets.

10. **Page 1-7** - A determination must be made as to why the sump has such a strong caustic pH. The two potential sources of contaminated water (groundwater or stormwater run-off) would not result in such a high pH. Therefore, it appears that the sump's sediments or the leaking sewer lines may be the source of the caustic contamination. This should be further investigated.

11. **Page 3-1** - What tests were done on the effluent or treated waters from the experimental activated alumina system in October and November of 1987? These analytical results should be included in the report to assess which discharge scenarios would be acceptable.

12. **Page 3-2** - The report should indicate whether discharging the treated waters to the RMA treatment system is consistent with the NPDES permit. If permit modifications are needed for this scenario, the time frame for implementing the modification should be included in the report.

13. **Page 3-3** - The report states that if cadmium and lead appear in the contaminated water, the activated alumina would not reduce the toxicity of these compounds. However page 3-1 indicates that a simple AA modification would remove these compounds. Is the "additional corrective action" referred to on page 3-3 a simple modification to the AA system or will a more substantial modification be needed? These statements should be clarified.

14. **Page 3-5** - The report should indicate whether contaminated groundwater stored in the sump will be transferred to the surface impoundment, or whether a pipe will be installed to discharge the water directly to the impoundment. Accumulation of water in the sump prior to discharge to the surface impoundment would not adequately discontinue groundwater contamination from the sump.

15. **Page 3-10** - Identifying and plugging leaking sewers cannot be demonstrated to be an appropriate remedy prior to identifying the source of liquids.

16. **Page 3-14** - See Comment No. 15.

17. **Page 3-17** - Alternative number 5 should not be implemented before determining the integrity of the existing sump. See General Comment No. 2.

18. **Page 3-18** - See Comment No. 15.

19. **Page 3-18** - Without identifying the source of the liquids, building a new sump may not remediate the infiltration problem.

20. **Page 3-20** - See General Comment No. 2.

21. **Page 3-22** - The objective of this interim action is to "reduce future releases of contaminated water and the potential adverse affects associated with a release of contaminated water." No action is therefore not an alternative to an interim action.

B:\SUMP1727.CMT